METHOD AND APPARATUS FOR A FOOD DELIVERY CONTAINER

BACKGROUND

It is customary for pizzas to be prepared for take-out by customers, or for delivery to the houses of persons who place orders for pizzas by telephone. One format for packaging pizzas in such circumstances is to place the pizza in a single-walled, paper-board box that folds up from a flat paper-board blank. Such boxes customarily enclose the pizza with a lid. The conventional means of packaging Chinese food, bakery products, or the like, other than pizza, for take out or for home delivery are also a cardboard box of square or rectangular shape.

Boxes of this type provide only a moderate degree of heat retention for the pizza during delivery. If the boxes are unvented, an extended delivery period can result in a pizza/food that is both cool and soggy.

The standard cardboard pizza box also has a number of drawbacks. For one thing, cardboard containers have a low insulation coefficient. Furthermore, during transportation, the pizza crust loses the rigid, crispy texture it had only 30 minutes earlier. The explanation for this is simple. As the steamy hot pizza is removed from the oven and placed in the box, it continues to give off moisture and heat until it has cooled. The standard cardboard box, though not perfectly airtight, retains substantially all of the moisture given off by the pizza. In essence, the pizza sits in a steam sauna during delivery. The final result is that the driest portion of the pizza (the crust) absorbs moisture and becomes limp.

Pizza/food loses heat by radiation, conduction, convection and current pizza boxes provide essentially no barrier to radiated heat loss and convection (hot air) loss.

Companies which provide home food delivery services are constantly seeking ways to improve the service, food quality and taste due to the

competitive nature of the business. Insulated food and pizza delivery bags have been used for many years whereby warmed foods will retain a certain temperature level during delivery, depending on the transportation time and delivery route length, primarily by blocking conduction of heat through the use of a bulky thick insulating barrier.

Yet, despite the proliferation of so-called "delivery" and "take out" items and services, mechanisms for effectively transporting the prepared food from one location to another have changed little over the past several decades. Referring to a familiar example, this lack of innovation in the food transportation industry is readily apparent.

No item of food is delivered to more American homes in greater quantities than the pizza. As the business of pushing pizzas exceeds the 32 billion dollar mark annually in the United States alone, multitudes of both multi-national and local establishments vie for their "slice" of the action.

At it's very best, though, a pizza delivered to your door pales in comparison to the same pizza served at a pizzeria. Apart from the ambiance of the red-checkered tablecloth and the spectacle of dough-tossing, pizzeria pizza is far superior because it has not suffered delivery deterioration. (e.g. cold and soggy)

The industry standard delivery time, pizza-to-door, is 30 minutes. The journey begins when the fresh, crisp-crusted, bubbling-cheese delicacy is removed from the oven and placed flat in the bottom of a box. Typically, the box is of the square, brown cardboard variety and may have a circular piece of reinforcing cardboard under the pizza to bolster its bottom. Then, the pizza is cut with a circular or "wheel" cutter. The box is closed, stacked on other pizza boxes and, when delivered by pizzeria personnel, is sometimes placed in a re-usable cumbersome insulating bag. The delivery driver tosses the bag into a delivery vehicle and makes the appointed rounds. It is during this journey that delivery deterioration occurs. The deterioration may be worse when a customer

self transports the pizza, since the customer will not have the benefit of an insulating bag which is bulky, unyielding, and not easily stored when not in use.

While previous devices are advantageous under certain circumstances, the need for a simple, inexpensive delivery/ transportation container for retaining a certain temperature level during delivery remains. From the foregoing it is apparent that a food packaging system is required that is low in cost yet ensures that food, after the time delay required for delivery, are still warm (or cold), without having become substantially soggy. Accordingly, there is a need for a food transportation container which will maintain the food in a freshly-cooked state (or a refrigerated state) during delivery of the food from its point of origin to its destination, or simply over an elapsed time period that will effectively maintain heat, that is lightweight, and can be effectively used by restaurants and consumers alike.

SUMMARY

A lightweight, disposable, and sealable food transportation container having a radiant barrier and a convection barrier, comprising a reflective material and an airtight material for slowing the heat transfer of an object placed within the container by minimizing heat lost by radiation and convection.

A system for maintaining the heat of a take-out food item, the system includes a disposable and sealable food transportation container having a radiant barrier and a convection barrier, the container includes a reflective material and an airtight material for slowing the heat transfer of an object placed within the container by minimizing heat lost by radiation and convection.

A system for maintaining the heat of a take-out food item, the system includes a disposable and sealable food transportation container having an integral radiant barrier and a convection barrier, the container includes a reflective material and an airtight material for slowing the heat transfer of an

object placed within the container by minimizing heat lost by radiation and convection.

A system for maintaining the heat of a take-out food item, the system includes a disposable and sealable food transportation container and an enclosure for surrounding the food item, the disposable container having a radiant barrier and a convection barrier, the container includes a reflective material and an airtight material for slowing the heat transfer of an object placed within the container by minimizing heat lost by radiation and convection.

In addition, the material used for the container should also be flexible, thin, and light so that it can be easily folded up when desired. Lastly, it is preferred that the material be inexpensive so that it is disposable.

A lightweight disposable container for blocking convection and radiation losses of an item placed within the container.

The above-described and other features and advantages of the present invention will be appreciated and understood by those skilled in the art from the following detailed description, drawings, and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an exemplary embodiment of a food container having its lid in the open position to reveal the heated food product;

Figure 2 is a perspective view of the food container seen in Figure 3 having its lid closed and joined to the body portion of the food container;

Figure 3 is top plan view of a food container before assembly showing phantom fold lines;

Figures 4-7 illustrate an alternative embodiment of the present invention;

Figure 8 illustrates another alternative embodiment of the present invention;

Figures 9 and 10 illustrate yet another alternative embodiment of the present invention; and

Figure 11 is a cross-sectional view of an alternative embodiment of the present invention.

DETAILED DESCRIPTION

This disclosure relates to packages, and is more particularly directed to packages for take out and/or delivery of pizzas, Chinese food, fast food hamburgers, dessert pies, and the like. The disclosure is more particularly concerned with a thermally insulated disposable container for pizzas or other food items to be served hot (or cold), the container being configured with a radiant barrier, and a convection barrier.

Referring to Figures 1 and 2, food container 20 includes a rectangular body portion 24 provided with a hinged lid 28, both of which are made of cardboard. The body portion 24 of the food container 20 includes a rectangular base section 30 integrally formed with upstanding front and rear walls 32 and 34, respectively, and a pair of laterally spaced upstanding side walls 38 and 40. The lid 28 has a rectangular top section 42 integrally formed with a pair downward depending laterally spaced side walls 44 and 46 and a front wall 48. A centrally located tab 50 is optionally cut out of the front wall 48 and is used to facilitate opening and closing of the lid 28. In addition, the lid 28 is hingedly connected to the rear wall 34 of the body portion 24 of the food container 20 at a score line 52 extending the length of the rear wall 34. Accordingly, the lid 28 is adapted to be folded downwardly about the score line 52 to a closed position wherein the side walls 44 and 46 and the front wall 48 of the lid 28 are located, as seen in Figure 2, within the confines of the body portion 24 adjacent the side walls 38 and 40 and front wall 32. Food containers of this

type are typically used for accommodating a heated pizza 54 as shown in Figure 1. Once the lid 28 is closed, the hot pizza 54 is located in a closed rectangular chamber 56, the inner air of which becomes heated due to the heat loss of the pizza 54. The insulating properties of the cardboard, although limited to some extent, serve to prevent the heat in the chamber 56 from being rapidly dissipated. Various pizza companies as well as various "Mom and Pop" stores utilize food containers of the above-described type for holding a heated pizza.

In an exemplary embodiment, a radiant barrier 60 is attached to at least an inside or outside portion 62 of rectangular top section 42 for reflecting heat in chamber 56 back towards the pizza 54, thus helping to retain the temperature level of the pizza and reduce dissipation of the heat from the rectangular top section 42 of food container 20.

Radiant barrier 60 provides a thin, integrated reflection/insulator that is integrated into the box. In one embodiment, barrier 60 is Aluminum.

Radiant barrier 60 works by reducing the heat transfer by thermal radiation across the air space in chamber 56 between the top of pizza 54 and the inside portion 62 of rectangular top section 42. Radiant barrier 60 has a reflective surface that faces the open air in chamber 56 and the top of pizza 54.

Heat travels from a warm area to a cool area by a combination of conduction, convection, and radiation. Heat flows by conduction from a hotter material to a colder material when the two materials touch. Heat transfer by convection occurs when a liquid or gas is heated, becomes less dense, and rises. Radiant heat travels in a straight line away from the hot surface and heats anything solid as the wave of energy hits the solid. Since most of the heat transfer from pizza 54 is emitted from the top where the sauce and cheese are not insulated by the crust, an exemplary embodiment comprises radiant barrier 60 depending from at least an inside portion 62 of rectangular top section 42 that is directly above pizza 54.

Conventional insulation traps still air within the insulation, and hence also reduces the heat transfer by air movement (convection). The insulation fibers or particles also block radiation heat transfer through the space occupied by the insulation; however, having insulation on top of a pizza is undesirable for obvious reasons.

Radiant barrier 60 comprises a thin sheet or coating of a highly reflective material applied to a substrate (i.e., the cardboard that makes up rectangular top section 42 in Figure 1.

In an exemplary embodiment, radiant barrier 60 is a metallized polymer applied to a portion of the inner or outer surface of container 20. In an alternative embodiment, radiant barrier is applied to substantially the entire inside or outside portion 62 of food container 20.

In yet another alternative radiant barrier is integrated into the box or the box is formed from a metalized cardboard. In this embodiment the metalized cardboard is preferably 24/1000 of an inch. Of course, and as applications may require the metalized cardboard can be greater or less than 24/1000 of an inch.

In practicing the present disclosure and using the pizza 54 as an example of a food product, the pizza 54 is initially baked and removed from the oven and placed on a cutting board. While on the cutting board, the pizza 54 is at a temperature of approximately 200 degrees Fahrenheit. The pizza 54 is then pre-cut into pie-shaped pieces and immediately placed within the food container 20 as seen in Figure 1 after which the lid 28 is closed. Once the lid 28 is closed, some of the heat from the hot pizza will be transferred to the air within the chamber 56 and as well as to the food container 20 in its entirety by a combination of convection and conduction. Most of the heat from the pizza 54 radiates from the top of a pizza in a straight line away from the hot sauce surface because the sauce topping has a higher emissivity than the surrounding crust and therefore a greater emitted radiation. The emitted radiation contacts the radiant

barrier 60 lining the lid 42 and radiates the heat back towards the pizza topping, thus aiding in heat retention.

Referring now to Figure 3, an alternative embodiment of a food container 20 is shown before assembly into a box structure. In an exemplary embodiment, the radiant barrier 60 is applied to substantially the entire inside or outside portion of food container 20. The above-described embodiments are also suitable for packaging hamburgers, hot grinders, and the like when the food container is configured to contain such foods.

Turning now to Figures 4-7, another exemplary embodiment of a food container 100 is shown. Figure 4 depicts a disassembled food container 100 having a radiant barrier sheet 102 comprising of a thin rectangular sheet of metalized oriented polyethylene. In an exemplary embodiment, the metalized oriented polyethylene has a thickness of about 0.00125 inches or 1.5 mm. Of course, is contemplated that the thickness of sheet 102 may be greater than or smaller than 0.00125 inches. Sheet 102 has the metalized layer on one side of sheet 102 while the other side is the polymer material from which sheet 102 is formed.

As an alternative, sheet 102 is a metalized polyethylene of approximately 1.25mm or 0.00125. Of course, this thickness may also vary. As yet another alternative, sheet 102 is polypropylene or polyethylene material with sufficient optical densities to act as potent reflective and convection barriers.

Container 100 provides a light-weight disposable container that has sufficient optical and reflective densities that will retain the heat and/or cold qualities of a food product inserted therein.

In one embodiment, container 100 is constructed out a thin polymer material that has an integral convection and reflective barrier (e.g. metalized oriented polyethylene). The thin and light-weight material of container 100 makes it ideal for use as a disposable food container. As will be

discussed herein, container provides an air-tight enclosure with optimum heat retention characteristics and is convenient for disposable usage. In addition, and when the container is no longer needed the user simply tears the container to open it as it is constructed out of a thin material.

Moreover, and since the container is used for food products it is desirable to have it be disposable.

It is noted that in one embodiment radiant barrier 102 is provided with a non-metalized periphery 104 to aid in the assembly of container 100. Alternatively, the entire sheet 102 can have a metalized layer or coating. During assembly sheet 102 is folded about line 106 and the non-metalized periphery is sealed at sides 108 and 110 to define the enclosure illustrated in Figure 5.

Figure 5 shows a completed food container 100 that has seams 112 and 114 sealed and an opening 116 to provide a bag or envelope to place food in for delivery. Seams 112 and 114 are formed by the melting of the non-metalized portions of the polymer sheet or alternatively by an adhesive attachment of the same.

A flap portion 118, as in an envelope, for closing the food container is formed by folding sheet 102 at an asymmetrical folding line such as line 106 in Figure 4. Thus, one half of folded sheet 102 is longer than the other half.

More specifically, flap portion 118 is a length that one half of sheet 102 that exceeds the other half when sheet 102 is folded about line 120. Flap portion 118 further includes an adhesive strip 122 with a peel off covering (e.g., peel off type used on envelopes) for adhering flap portion 118 to a portion of container 100 after an item has been inserted into container 100. Flap portion 118 is sufficiently long enough to provide enough material to seal container 100 after an item such as a pizza box has been inserted inside.

Due to its light-weight configuration container 100, through the use of flap portion 118 and its complimentary adhesive strip allows the sealed configuration of container 100 to be varied. For example, and in the case when a small item is placed in container 100 (e.g. a single slice of pizza) the user simply folds container 100 until the enclosed item is snugly encased and then the covering of the adhesive strip is removed and the container is sealed.

Figures 6 and 7 illustrate container 100 in an assembled state and being configured to accommodate a box carton in opening 116. In exemplary embodiment, container 100 has the following dimensions (24" x 24") in order to accommodate a standard size pizza box. Of course, the dimensions of container 100 may vary to accommodate objects of varying sizes.

Opening 116 is configured for easy placement of a complementary configured box (e.g., a pizza box) within food container 100. Due to the flexible nature of sheet 102, container 100 is easily folded and provides a flat configuration for storage. Thus, numerous containers can be easily stored for use in restaurant applications.

Current "pizza bags", (e.g., delivery bags) are primarily insulators and by necessity, they must be thick and cumbersome. In accordance with an exemplary embodiment of the present invention and by blocking convection and radiation losses the materials for the bags or container 100 can be constructed out of much thinner, lighter, and less costly materials which are disposable.

In a quantitative test utilizing a pizza bag (i.e., food container 100) constructed in accordance with an exemplary embodiment of the present invention, one boxed pizza using a standard pizza box was placed within the sealed container 100 and another boxed pizza was left standing alone, both in a room at room temperature, after 17 minutes elapsed, the temperature of the pizza placed in the pizza bag was 142.5° Fahrenheit and the unbagged pizza was 123.4° Fahrenheit. Container 100 provided a pizza that was 15.5% hotter. In

addition, four blinded subjects accurately picked the bagged pizza as hotter compared to the un-bagged pizza.

In addition, while the pizza is placed within container 100 moisture from the steaming pizza as well as moisture from the standard cardboard box is condensated onto the outside of the box. This important feature allows the moisture to vent out of the inside of pizza box 150 and harmlessly condensate on the exterior surface of the pizza box preventing the pizza from becoming soggy.

For example, and referring now to Figures 6 and 7, a conventional pizza box 150, with the pizza 54 in place, is inserted into container 100. The container 100 is configured and dimensioned so as to contain a complementary sized pizza box 150 as well as expand (Figure 6) due to heat from pizza 54. After insertion of pizza box 150 into container 100, pizza box 150 is then sealed within container 100 through the use of flap 118 and adhesive 122.

In this configuration, openings 154 provide a ventilation outlet or outlets to permit escape of moisture that dissipates from the heated pizza 54, thus diminishing the tendency of such pizzas to become soggy, while providing a radiant barrier to reflect heat energy back towards the pizza 54. In such a configuration, the heat retention by the pizza is enhanced while the amount of moisture dissipated onto the pizza is limited. Accordingly, the likelihood of a soggy pizza due to moisture is reduced and/or negated, whilst simultaneously maintaining the heat of the pizza/food.

Accordingly, and through the use of container 100, the heated air travels from the internal cavity of pizza box 150 travels through vent openings 154 and is entrained within the cavity defined by container 100. In addition, and through this airflow moisture from pizza 54 as well as the moisture of the cardboard material comprising box 150 is harmlessly vented out of pizza box 150 and ultimately condensated on the exterior surface of the same.

In yet another alternative, container 100 is used in combination with the embodiment of Figures 1-3 further enhancing the heat retention qualities of the present invention.

Further combinations are also contemplated including but not limited to pizza box 150 being constructed with radiant barrier 60 on either the inside or outside portion of the pizza box. In addition, it is also contemplated that radiant barrier 60 may be positioned on both the inner and outer portions of the pizza box which is then inserted within container 100, effectively maximizing heat retention utilizing a bag and box system.

In addition, a pizza box construction in accordance the embodiments of Figures 1-3 is contemplated for use with container 100.

Referring now to Figure 8, yet another alternative embodiment is illustrated, here sheet 102 is provided with a thin layer of insulative material 130 configured and dimensioned to be about half the size of sheet 102. Insulative material 130 is disposed on a first half 132 of radiant sheet 102.

The other half of sheet 102 is folded over insulative material 130 at fold 132 and the two sides are sealed essentially providing a three-ply sheet material. This three-ply sheet material is then folded as illustrated in Figure 4 to provide container 100.

Alternatively, and referring now to Figures 4-8 and 11, sheet 102 is folded over itself once and then again and the two sides are sealed essentially providing a three-ply sheet material 140, comprising a metal reflective layer 142 as a radiant barrier facing the food, a middle convection barrier 144 an insulating layer, and an outer metal reflective layer 146 facing the outside environment that can be water resistant to protect the food from outside elements (e.g., rain) and contain the food in the food container in the event of a the food spill. For example, and when sheet 102 is folded over itself layers 142 and 146 are

provided by the metalized polymer of sheet 102 and insulative layer 144 is provided by the air entrained between sheet 102 as it is folder over on itself.

Thus, and referring now to Figure 11 a Trilaminar design including an inner reflective, a middle layer or convection barrier and an outer layer (reflective) provide the material for container 100.

In yet another alternative, the surface of sheet 102 comprising layer 146 is configured to have a higher concentration of metalized polymer.

In addition, the material used for the container should also be flexible, thin, and light so that it can be easily folded up when desired. Lastly, it is preferred that the material be inexpensive so that it is disposable.

Additionally, the material for container is also contemplated to be capable of having indicia printed thereon. The indicia may included advertising materials or trademarks, etc.

Referring now to Figure 9, an alternative embodiment 300 of container 100 is shown with a drawstring closure 304 that considerably reduces the rate of heat loss from a packaged pizza, Chinese take-out, or the like, stored therein by (reducing the size of the opening from which the heat energy of the packaged food can escape to a lower-temperature outside environment) mechanisms previously described (radiating heat and blocking convection currents).

Figure 10 illustrates another alternative embodiment of a food container shown generally at 400 for considerably reducing the heat energy absorbed by a cold food stored therein by reducing the amount of heat energy from a higher-temperature outside environment from reaching the cold food stored within bag 400 (i.e., cold soda can). One embodiment of bag 400 is bag 300 turned inside out, wherein the reflective layer is facing the higher-temperature outside environment providing a radiant barrier for the higher-temperature heat energy and thereby reducing the emissivity of bag 400 to emit

the heat energy to the cold food stored therein. In quantitative tests with bag 400, two cold soda beverage cans were taken from a refrigerator at 45° Fahrenheit. One soda can was placed in bag 400 and closed via drawstring 404, the other soda can was left alone in the same room at room temperature. After 45 minutes elapsed, the bagged soda can was at a 48° Fahrenheit and the unbagged soda can was at a temperature of 51.6° Fahrenheit. It will be appreciated that in a warmer outside climate, the differential is significantly larger.

Current "pizza bags", (e.g., delivery bags) are primarily insulators and by necessity, they must be thick and cumbersome. In accordance with an exemplary embodiment of the present invention and by blocking convection and radiation losses the materials for the bags or container 100 can be constructed out of much thinner, lighter, and less costly materials which are disposable.

As a result of the present disclosure, an economical and disposable heat maintaining food delivery container is provided. Through its combination of components, embodiments described herein meet both the customer's desire to receive delivered pizzas/food which are still highly palatable, in terms of warmth and crispness, and the pizza supplier's desire to minimize packaging costs. On the basis of the foregoing it will be seen that this disclosure has been described which will allow pizza to be delivered to consumers in a low cost format, while providing for the preservation of the quality of the product up to the time of delivery. Likewise, an economical and disposable bag is provided for keeping food cold longer.

While the invention has been described with reference to an exemplary embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof.

Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.